PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : A23L 1/30, A61K 31/575 — A1

(11) International Publication Number: **WO 98/28990**

(43) International Publication Date: 9 July 1998 (09.07.98)

(21) International Application Number: PCT/FI97/00797

(22) International Filing Date: 17 December 1997 (17.12.97)

(30) Priority Data:
965251 30 December 1996 (30.12.96) FI

Applicant *(for all designated States except US)*: PHARMACONSULT OY [FI/FI]; Riippakoivunkuja 5, F-02130 Espoo (FI).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: KARPPANEN, Heikki, Olavi [FI/FI]; Riippakoivunkuja 5, F-02130 Espoo (FI). KARPPANEN, Pasi, Heikki [FI/FI]; Haahkatie 8 A 4, F-00200 Helsinki (FI). KARPPANEN, Pirjo, Kylli, Maria, Laelia [FI/FI]; Riippakoivunkuja 5, FIN-02130 Espoo (FI). NEVALAINEN, Mari, Laelia, Susanna [FI/FI]; Päivänkilonkuja 6 B 11, FIN-02210 Espoo (FI).

(74) Agent: RUSKA & CO. OY; Runeberginkatu 5, FIN-00100 Helsinki (FI).

(81) Designated States: AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), EE, EE (Utility model), ES, FI, FI (Utility model), GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

Published
With international search report.

(54) Title: A METHOD TO PREPARE FOOD SEASONING, FOOD INGREDIENT AND FOOD ITEM COMPOSITIONS, SEASONING AND USE THEREOF

(57) Abstract

A method of preparing food seasoning, food ingredients and food items is disclosed, comprising the incorporation of plant sterols and/or stanols or their derivatives together with a raised level of one or more of the minerals magnesium, calcium and potassium. Ingestion of food supplied with the said combination leads to a significant decrease in both cholesterol level and blood pressure. The decrease is larger than that expected from the sum of the effects of plant sterols and minerals. Also disclosed are food seasonings for use in the preparation of foods having the said characteristics.

rol only if they are present in the intestine simultaneously with the dietary cholesterol. In the invention in accordance with PCT/FI91/00139, a stanol ester is incorporated in vegetable fat which is essentially free of cholesterol. Furthermore, the main embodiment of said invention is margarine which is commonly used with bread, a food item also essentially free of cholesterol. It has to be borne in mind that, by far the most prominent sources of dietary cholesterol are eggs, meats and meat products, as well as butter and other dairy products.

Moreover, the rate of the endogenous synthesis of cholesterol may be a more important factor in the long-term control of serum cholesterol level than the intestinal absorption. Unfortunately, the use of sitostanol according to PCT/FI91/00139, or increased intake of other compounds which decrease the gastrointestinal absorption of dietary cholesterol, increase the endogenous synthesis of cholesterol remarkably, by 34.9 % in a recent study (T.A. Miettinen, Duodecim 1996; 112: 1149-1154). Therefore, the increased synthesis of cholesterol in the body markedly counteracts the serum cholesterol lowering effect of sitostanol and that of the natural plant sterols. These factors may explain the fact that, according to long-term experience, increased intakes of these sterols and stanols lead to a mild fall of serum cholesterol levels only.

It should also be borne in mind that, the detrimental effects of a given serum cholesterol level on blood vessels and cardiovascular diseases may be remarkably influenced by several, partly hitherto unidentified factors.

Summary of the invention

It was discovered that, by increasing the levels of the essential mineral element nutrients potassium and, in particular, those of magnesium and calcium in appropriately high concentrations in the diet and, hence, in the gastrointestinal tract simultaneously with the increase of plant sterols and/or their stanol derivatives, an unexpected beneficial interaction takes place, greatly exceeding any effect which one could expect on the basis of current knowledge. Surprisingly, the lowering of serum cholesterol levels exceeds remarkably, even several fold, that produced by the plant sterols when these agents are used according to the prior art.

An objective of the present invention was to create a method which, using naturally occurring food constituents, could produce seasoning, food ingredient and, ultimately, food com-

positions which, in a natural, physiological way, should be able to bring about a more effective lowering of serum cholesterol than plant sterols, their stanols or the fatty acid ester derivatives of the sterols and stanols do when used according to prior art methods. In fact, a new method and compositions of food ingredient mixtures, seasonings and, ultimately, food items which, when ingested by oral route, lead to an unexpectedly effective lowering of serum cholesterol, were invented.

Another objective of the invention is to provide a food seasoning which, when used in the method according to the invention, can provide the appropriate levels of a) sterol / stanol or a fatty acid derivative thereof, b) the minerals potassium, magnesium and calcium, in the ultimate food items.

Experimental results demonstrating the effectiveness of the invention

The genetically obese Zucker rat provides a suitable model for examining the effects of various dietary factors or drugs on, among other things, serum cholesterol, and blood pressure.

The effectiveness of the present invention was studied in Zucker rats. In the beginning of the study the rats were clearly obese and had reached an average body weight of 360 grams. The serum cholesterol level was 3.0 mmol/l and the blood pressure 125 mm Hg.

Group 1 (Control diet group): During the 14-day experimental period these 10 rats received a commercial diet containing all the essential nutrients, including adequate levels of the mineral elements sodium, potassium, magnesium, and calcium, to maintain normal body functions. To mimic current human diets, the diet also comprised 18 % of butter, 1 % of cholesterol and sodium chloride (common salt) at the level of 6 % of the dry weight of the diet.

During the following 2 weeks, the average serum cholesterol level in this group increased to the level of 10.5 mmol/l. The blood pressure increased by an average of 4 mm Hg.

Group 2 (Plant sterol diet according to the prior art): This group of 10 Zucker rats received a diet in which the caloric and other content of diet was otherwise exactly the same as in

Group 1, but a mixture of the plant sterols (75 % of beta-sitosterol and 25 % of beta-sitostanol) was added to the diet at the level of 1 % of the dry weight of the chow. The average serum cholesterol level was reduced by 1.6 mmol/l (15 %) to the level of 8.9 mmol/l. The average rise of blood pressure was 4 mm Hg and, hence, similar to that in Group 1.

Group 3: (Diet with added calcium, magnesium and potassium): This group of 10 Zucker rats received a diet in which the caloric and other content of diet was otherwise exactly the same as in Group 1, but magnesium was added at the dietary level of 0.13 %, calcium at the level of 3 %, and potassium at the level of 1.57 %. These additions are higher than the existing dietary recommendations.

The serum cholesterol level was significantly lowered to an average level of 8.3 mmol/l ($p<0.05$). As compared to the cholesterol level in the control group (Group 1) the serum cholesterol level was reduced by 2.2 mmol/l (21 %). There was no change in the blood pressure level.

Group 4 (Combination of the additions of plant sterols as in Group 2 and calcium, magnesium and potassium as in Group 3): This group of 10 Zucker rats received a diet in which the caloric and other content of diet was otherwise exactly the same as in Group 1, but a mixture of the plant sterols (75 % of beta-sitosterol and 25 % of beta-sitostanol) was added to the diet at the level of 1 % of the dry weight of the chow, and magnesium was added at the dietary level of 0.13 %, calcium at the level of 3 %, and potassium at the level of 1.57 %.

The serum cholesterol level was dramatically lowered by this diet as compared with any other of the experimental groups ($p<0.001$). In this group the average serum cholesterol level was as low as 4.6 mmol/l. Hence this diet lowered serum cholesterol as much as 5.9 mmol/l (56.2 %).

Since the effect of the plant sterols in Group 1 was 1.6 mmol/l and that of the additions of calcium, magnesium, and potassium in Group 3 was 2.2 mmol/l, a larger cholesterol decrease was not to be expected than that caused by the sum of these two effects (1.6 mmol/l + 2.2 mmol/l = 3.8 mmol/ or 36.2 %).

The actual decrease by the diet prepared according to the present innovation was, however, remarkably (2.1 mmol/l or 20 %-units) more than the expected effect. Furthermore, quite

unexpectedly the blood pr ssure was reduced by an average of 7 mm Hg, hence producing a beneficial difference of 11 mm Hg, as compared to the diet with added plant sterol (Group 2) and 7 mm Hg as compared to the diet with added calcium, magnesium and potassium. Therefore, even the beneficial effect on blood pressure was much larger than could be expected on the basis of the sum effect of added plant sterols alone, on the one hand, and added calcium, magnesium and potassium, on the other hand.

Hence, two different, important and unexpected advantages over the prior art were simultaneously produced by food prepared according to the present invention.

In the experiments described above, sodium was intentionally kept at a high level in the diet. In view of the important pathogenetic role of dietary sodium in arterial hypertension and various cardiovascular diseases it is, however, desirable to avoid excessive additions of sodium compounds. In fact, the present invention has the further advantage that it decreases the need to use salt (sodium chloride) and other sodium compounds so that, in comparison to food items in common use, a decreased sodium concentration in the ultimate edible food items is also achieved.

Description of the preferred embodiments

As the source of beta-sitosterol, beta-sitostanol, stigmasterol, stigmastanol, campesterol, campestanol, dihydrobrassicasterol, and dihydrobrassicastanol, said sterols and stanols hereinafter referred to as "plant sterol/stanol", it is possible to use in the method according to the present invention:

1) Naturally occurring plant sterols and stanols, particularly beta-sitosterol and beta-sitostanol but also stigmasterol, campesterol, and dihydrobrassicasterol concentrated or purified from tall oil, soy beans, rapeseeds, coconuts, corn, peanuts, or other natural sources. Methods previously published and generally known to those skilled in the art are applied to improve the solubility of "plant sterol/stanol" while incorporating these compounds in food ingredients, seasonings and food items according to the present invention. When plant concentrates with high concentrations of sterols are used, there is no need to remove such naturally occurring, accompanying compounds as phytoestrogens and flavonoids

which, when left in the sterol concentrate, may even further enhance the beneficial health effects of the ultimate edible food items prepared according to the present invention. In fact, the present invention could serve as a suitable vehicle for supplementation of phytoestrogens, flavonoids, beta-carotene, vitamins A, D, and E as well as other vitamins, other mineral elements and other beneficial dietary factors, other active ingredients of natural origin, or even drugs.

2) It is also possible to use the hydrogenated forms of the aforementioned natural plant sterols, the so-called stanols.

3) Both the sterols and stanols can be used either as the unmodified parent compounds, or as their fatty acid esters if a good solubility in the fatty part of the food ingredients, seasoning mixtures, or the ultimate edible food items is desired.

As the source of the mineral element nutrient cations, in the method according to the present invention it is possible to use any physiologically acceptable magnesium, calcium, potassium, and sodium compound, as well as magnesium, calcium, potassium, and sodium bound in high concentrations naturally or artificially to dietary fibers.

Preferable magnesium compounds include, but are not limited to, in particular magnesium sulphate, manesium chloride, magnesium hydroxide, magnesium oxide, and magnesium carbonate, but also many other compounds such as magnesium salts of amino acids, magnesium-rich dietary fibers and other physiologically acceptable magnesium compounds are possible.

Preferable calcium compounds include, but are not limited to, in particular calcium carbonate, calcium lactate, and calcium chloride, but also many other compounds such as calcium phosphates, calcium sulphate, calcium citrates, calcium tartrate, calcium acetate, calcium propionate, calcium alginate, calcium glutamate, calcium gluconate and other physiologically acceptable calcium compounds are possible.

Preferable potassium compounds include, but are not limited to, in particular potassium chloride, potassium(bi)carbonate, potassium lactate, and potassium sulphates, but also many other potassium compounds such as potassium phosphates, potassium tartrate, potassium acetate, potassium propionate, potassium alginate, potassium gluconate, potassium-rich dietary fibers, and other physiologically acceptable potassium compounds are possible.

Preferable sodium compounds include, but are not limited to, in particular sodium chloride, sodium glutamate, sodium lactate, and sodium (bi)carbonate, but also many other compounds such as sodium phosphates, sodium sulphates, sodium acetate, sodium citrate, sodium propionate, sodium tartrate, sodium alginate, sodium gluconate, and other physiologically acceptable sodium compounds are possible.

The method in accordance with the present invention can be used for changing the composition of a number of food items, such as, for example, bread, cookies and biscuit-like products; sausages and other meat products; egg foods, dairy products, baby foods, salad dressings, and also for novel seasoning compositions. Seasoning compositions according to the present invention can be used for the seasoning of, for example, such food items as bacon, eggs, miso and other soups, porridge meals, corn flakes, rice flakes, rice cakes, wheat flakes, oat flakes, rye flakes, barley flakes, and various types of "muesli". These may be prepared and seasoned according to conventional industrial practices, except that a part or all of the conventional seasonings and salt are replaced by the above described seasoning. In most instances the conventional use of common salt can be entirely avoided by the use of the seasonings prepared according to the present invention.

Seasonings according to the present invention can also be used to replace common salt in a great variety of other industrially prepared food items as well as in the preparation of foods both in restaurants, catering, home kitchens etc. Such seasonings are particularly suitable for soups, beefs and other foods in which salty and/or spicy seasonings are used, for the preparation of various food ingredient mixtures, such as, for example, flour or meal and salt mixtures for the preparation of bread, muesli, corn and rice flakes and breakfast cereal products. These ingredient mixtures and seasonings, when added to various foods, change the food composition in accordance with the method of the present invention.

In the following, examples are given to demonstrate the preparation of food seasoning and food items according to the present invention. In these examples, "plant sterol/stanol" refers to the combined weight of beta-sitosterol, beta-sitostanol, stigmasterol, stigmastanol, campesterol, campestanol, dihydrobrassicasterol, and dihydrobrassicastanol, represented by the parent compound only, i.e., excluding the weight of the possible fatty acids esterified to the sterols and stanols.

Example 1. WHITE BREAD

A pre-mix is made of the following formulation:

Sodium chloride	0.60 kg
"Plant sterol/stanol"	2.00 kg
Magnesium sulphate ($MgSO_4 \cdot 7H_2O$)	0.126 kg
Magnesium hydroxide {$Mg(OH)_2$}	0.020 kg
Calcium carbonate	0.080 kg
Potassium chloride	0.294 kg
l-lysine hydrochloride	0.021 kg
Wheat flour	7.500 kg

The following ingredients are added to the pre-mix, and a conventional white bread is made in a conventional commercial baking operation by the straight dough method:

Wheat flour	30.00 kg
Vital wheat gluten	0.37 kg
Promosoy 13[1]	0.55 kg
Format[2]	0.50 kg
Shortening (vegetable oil)	1.12 kg
Yeast	1.75 kg
Water	23.75 kg

[1]Contains soy protein isolate, non-fat dry milk and emulgators (Engelhardt & Co., Sweden)

[2]Contains diacetyl tartaric acid esters, $CaCO_3$ and ascorbic acid with malt flour and sugar (Ireks Arkady, Germany)

The formulation, containing all the ingredients, is mixed at low speed, dough temperature 27 °C, floor time 30 min, baked in the form of Pullman loaves, fermentation ca. 40 min at 38-40 °C and 80 % relative humidity, baked for 30 min at an oven temperature of 230 °C. This is a good, commercial quality, standard white bread.

Example 2. RYE BREAD

A pre-mix is made of the following formulation:

Sodium chloride	0.60 kg
"Plant sterol/stanol"	2.00 kg
Magnesium sulphate ($MgSO_4 \cdot 7H_2O$)	0.126 kg
Magnesium hydroxide {$Mg(OH)_2$}	0.020 kg
Calcium carbonate	0.080 kg
Potassium chloride	0.294 kg
l-lysine hydrochloride	0.021 kg
Rye meal[1]	9.57 kg

The following ingredients are added to the pre-mix, and a conventional sour rye bread is made in a conventional commercial baking operation:

Rye meal[1]	20.00 kg
Vital wheat gluten	0.64 kg
Coarse rye meal	5.71 kg
Wheat flour	10.00 kg
Yeast	0.67 kg
Water	33.37 kg

[1]Part of rye meal and water are fermented with natural starter overnight, final pH 3.9.

The formulation, containing all the ingredients, is mixed for 7 min at low speed, dough temperature 27 °C, dough pH 4.4, floor time 60 min, baked in the form of Pullman loaves, fermentation ca. 40 min at 38-40 °C and 70 % relative humidity, baked for 37 min at an oven temperature of 230 °C.

This is a good, commercial quality, standard sour rye bread.

Preferably, the concentrations by weight of plant sterol/stanol or derivatives thereof, and of the advantageous mineral elements in the final bread products made by the method according to the present invention are: Sterol 0.1 - 8 %, Mg 0.01 - 1 %, Ca 0.01 - 1 %, and K 0.1 - 1.5 %.

Example 3. MARINADE

A marinade for various types of meats, fish and vegetables is made in a conventional commercial operation from the following formulation:

Vegetable oil	0.7680 kg
"Plant sterol/stanol"	0.1440 kg
Calcium chloride ($CaCl_2 \cdot 6H_2O$)	0.0023 kg
Magnesium sulphate ($MgSO_4 \cdot 7H_2O$)	0.0023 kg
Potassium chloride (KCl)	0.0054 kg
Sodium chloride (NaCl)	0.0109 kg
l-Lysine hydrochloride	0.0004 kg
Honey	0.0288 kg
Vinegar (10 weight %)	0.0288 kg
Spices	0.0096 kg

The "Plant sterol/stanol" is first mixed with the vegetable oil. Calcium chloride, magnesium sulphate, potassium chloride, sodium chloride, l-lysine hydrochloride and honey are mixed with vinegar, and the mixture and the spices are added to the mixture of the vegetable oil and "Plant sterol/stanol". All the ingredients are mixed thoroughly.

Preferably, the concentrations by weight of plant sterol/stanol or derivatives thereof, and of the advantageous mineral elements in the marinades made by the method according to the present invention are: Sterol 0.5 - 18 %, Mg 0 - 1 %, Ca 0 - 1 %, and K 0 - 2.5 %.

Example 4. SEASONING

A mechanical mixture of the following formulation is made:

"Plant sterol/stanol"	2.12 kg
Calcium carbonate ($CaCO_3$)	3.80 kg
Magnesium sulphate ($MgSO_4 \cdot 7H_2O$)	0.910 kg
Potassium chloride (KCl)	2.12 kg
Sodium chloride (NaCl)	4.32 kg
Sodium glutamate	0.40 kg
l-Lysine hydrochloride	0.15 kg
(Spices; optional)	1.00 kg

All the ingredients are mixed thoroughly with a conventional industrial mixer but taking care that excessive heat is not formed during the process.

Preferably, the concentrations by weight of plant sterol/stanol or derivatives thereof, and of the advantageous mineral elements in the final seasoning made by the method according to the present invention are: Sterol 2 - 98 %, Mg 0 - 30 %, Ca 0 - 30 %, and K 0 - 50 %.

Example 5. SAUSAGE

A pre-mix of the following formulation is made:

"Plant sterol/stanol"	0.270 kg
Calcium chloride ($CaCl_2.6H_2O$)	0.057 kg
Magnesium sulphate ($MgSO_4 \cdot 7H_2O$)	0.057 kg
Potassium chloride (KCl)	0.132 kg
Potassium lactate	0.090 kg
Sodium chloride (NaCl)	0.270 kg

Sodium lactate	0.090 kg
l-Lysine hydrochloride	0.010 kg

This pre-mix is thoroughly mixed with the following ingredients:

Meat, including natural fat	12.500 kg
Milk powder	0.840 kg
Potatoe starch	1.160 kg
Water	6.450 kg
...um nitrite ($NaNO_2$, 10 % solution)	0.030 kg
Spices	0.085 kg

The sausage is processed according to generally known conventional industrial techniques.

Example 6. MINCEMEAT STEAK (HAMBURGER STEAK)

Minced meat.	9.67 kg
"Plant sterol/stanol"	0.07 kg
Seasoning of example 4 (with spices)	0.26 kg

The plant sterol and the seasoning are mixed with the minced meat. Thereafter the mince-meat steak is prepared according to the processes conventionally used in the preparation of steaks, e.g for hamburger restaurants. One serving is a 200 gram steak.

Example 7. STEAK OF MINCED FISH

Minced fish	9.67 kg
"Plant sterol/stanol"	0.07 kg
Seasoning of example 4 (with spices)	0.26 kg

The plant sterol and the seasoning are mixed with the minced fish. Thereafter the steak of minced fish is prepared according to the processes conventionally used in the preparation of steaks for hamburger restaurants. One serving is a 200 gram steak.

Example 8. SOY STEAK

Soy protein mixture	9.67 kg
"Plant sterol/stanol"	0.07 kg
Seasoning of example 4 (with spices)	0.26 kg

The plant sterol and the seasoning are mixed with the soy protein mixture conventionally used for the preparation of soy steaks. Thereafter the steak is prepared according to the processes conventionally used in the preparation of soy steaks. One serving is a 200 gram steak.

Preferably, the concentrations by weight of plant sterol/stanol or derivatives thereof, and of the advantageous mineral elements in the final sausage or steak products made by the method according to the present invention are: Sterol 0.1 - 10 %, Mg 0.01 - 1.5 %, Ca 0.01 - 1.5 %, and K 0.1 - 1.5 %.

Example 9. MAYONNAISE

Vegetable oil	0.650 kg
"Plant sterol/stanol"	0.065 kg
Calcium chloride ($CaCl_2 \cdot 6H_2O$)	0.0012 kg
Magnesium sulphate ($MgSO_4 \cdot 7H_2O$)	0.0012 kg
Potassium chloride (KCl)	0.0028 kg
Sodium chloride (NaCl)	0.0057 kg
l-Lysine hydrochloride	0.0002 kg
Sugar	0.030 kg
Vinegar (10 weight %)	0.030 kg
Mustard	0.020 kg

Water	0.194 kg

The mayonnaise is prepared by homogenization by conventional industrial methods.. Preferably, the concentrations by weight of plant sterol/stanol or derivatives thereof, and of the advantageous mineral elements in the final mayonnaise made by the method according to the present invention are: Sterol 0.5 - 15 %, Mg 0 - 3 %, Ca 0 - 3 %, and K 0 - 3 %.

Example 10. MIXTURE OF VEGETABLE OIL AND BUTTER

Vegetable oil	0.350 kg
"Plant sterol/stanol"	0.150 kg
Butter	0.478 kg
Calcium chloride ($CaCl_2 \cdot 6H_2O$)	0.0024 kg
Magnesium sulphate ($MgSO_4 \cdot 7H_2O$)	0.0024 kg
Potassium chloride (KCl)	0.0056 kg
Sodium chloride (NaCl)	0.0114 kg
l-Lysine hydrochloride	0.0004 kg

The plant sterol is added to the vegetable oil and mixed thoroughly. Thereafter this mixture and the other ingredients are added to the butter and mixed according to conventional dairy practice to make the mixture of vegetable oil and butter.
Preferably, the concentrations by weight of plant sterol/stanol or derivatives thereof, and of the advantageous mineral elements in the final vegetable oil/butter products made by the method according to the present invention are: Sterol 0.5 - 15 %, Mg 0 - 0.4 %, Ca 0 - 1 %, and K 0 - 1.5 %.

Example 11. SALAD DRESSING

Vegetable oil	2.0000 kg
"Plant sterol/stanol"	0.2000 kg

Calcium chloride ($CaCl_2 \cdot 6H_2O$)	0.0048 kg
Magnesium sulphate ($MgSO_4 \cdot 7H_2O$)	0.0048 kg
Potassium chloride (KCl)	0.0112 kg
Sodium chloride (NaCl)	0.0228 kg
l-Lysine hydrochloride	0.0008 kg
Vinegar (10 weight %)	0.1200 kg
Water	1.6360 kg

The salad dressing is prepared by homogenization by conventional industrial methods. Preferably, the concentrations by weight of plant sterol/stanol or derivatives thereof, and of the advantageous mineral elements in the final salad dressing made by the method according to the present invention are: Sterol 0.5 - 8 %, Mg 0 - 3 %, Ca 0 - 3 %, and K 0 - 3 %.

Example 12 YOGURT

During the preparation of 100 kg of yogurt according to conventional commercial techniques the following ingredients are added and carefully mixed:

"Plant sterol/stanol"	1.000 kg
Magnesium oxide (MgO)	0.225 kg

Preferably, the concentrations by weight of plant sterol/stanol or derivatives thereof, and of the advantageous mineral elements in the final yogurt made by the method according to the present invention are: Sterol 0.2 - 10 %, Mg 0.01 - 3 %, Ca 0.1 - 3 %, and K 0.1 - 3 %.

Claims:

1. A method of producing food seasoning, food ingredient and/or food item compositions which decrease elevated serum cholesterol and lower elevated blood pressure, comprising the addition of at least one plant sterol or plant sterol derivative from the group consisting of beta-sitosterol, stigmasterol, campesterol, dihydrobrassicasterol, and/or the hardened stanol forms of said sterols, and/or fatty acid esters of the said sterols and stanols, and the addition of at least one mineral element nutrient selected from the group consisting of magnesium, calcium, and potassium.

2. A method according to claim 1 comprising incorporating in a bread, cookie or biscuit like food a plant sterol or plant sterol derivative, magnesium, calcium, and potassium in an amount producing in the ultimate edible bread a plant sterol or plant sterol derivative concentration by weight of between 0.1 to 8 %, a magnesium concentration of between 0.01 to 1 %, a calcium concentration of between 0.01 to 1 %, and a potassium concentration of between 0.1 to 1.5 %.

3. A method according to claim 1, comprising incorporating in a sausage or steak a plant sterol or plant sterol derivative, magnesium, calcium, and potassium in an amount producing in the ultimate edible sausage or steak a plant sterol or plant sterol derivative concentration by weight of between 0.1 to 10 %, a magnesium concentration of between 0.01 to 1.5 %, a calcium concentration of between 0.01 to 1.5 %, and a potassium concentration of between 0.1 to 1.5 %.

4. A method according to claim 1, comprising incorporating in a vegetable oil-butter mixture a plant sterol or plant sterol derivative, magnesium, calcium, and potassium in an amount producing in the ultimate edible vegetable oil-butter mixture a plant sterol or plant sterol derivative concentration by weight of between 0.5 to 15 %, a magnesium concentration of between 0 to 0.4 %, a calcium concentration of between 0 to 1 %, and a potassium concentration of between 0 to 1 % .

5. A method according to claim 1 comprising incorporating in a marinade a plant sterol or plant sterol derivative, magnesium, calcium, and potassium in an amount producing in the ultimate marinade a plant sterol or plant sterol derivative concentration by weight of between 0.5 to 18 %, a magnesium concentration of between 0 to 1 %, a calcium concentration of between 0 to 1 %, and a potassium concentration of between 0 to 2.5 %.

6. A method according to claim 1 comprising incorporating in a salad dressing a plant sterol or plant sterol derivative, magnesium, calcium, and potassium in an amount producing in the ultimate salad dressing a plant sterol or plant sterol derivative concentration by weight of between 0.5 to 8 %, a magnesium concentration of between 0 to 3 %, a calcium concentration of between 0 to 3 %, and a potassium concentration of between 0 to 3 %.

7. A method according to claim 1 comprising incorporating in a mayonnaise a plant sterol or plant sterol derivative, magnesium, calcium, and potassium in an amount producing in the ultimate mayonnaise a plant sterol or plant sterol derivative concentration by weight of between 0.5 to 15 %, a magnesium concentration of between 0 to 3 %, a calcium concentration of between 0 to 3 %, and a potassium concentration of between 0 to 3 %.

8. A method according to claim 1 comprising incorporating in a yogurt a plant sterol or plant sterol derivative, magnesium, calcium, and potassium in an amount producing in the ultimate yogurt a plant sterol or plant sterol derivative concentration by weight of between 0.2 to 10 %, a magnesium concentration of between 0.01 to 3 %, a calcium concentration of between 0.1 to 3 %, a potassium concentration of between 0.1 to 3.

9. A food seasoning comprising a plant sterol or plant sterol derivative, magnesium, calcium, and potassium in an amount producing in the seasoning a plant sterol or plant sterol derivative concentration by weight of between 2 to 98 %, a magnesium concentration of between 0 to 30 %, a calcium concentration of between 0 to 30 %, and a potassium concentration of between 0 to 50 %.

10. The use of a food seasoning according to claim 9 in food ingredients or food items.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 97/00797

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: A23L 1/30, A61K 31/575
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: A23L, A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI, EPODOC, CAPLUS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4824672 A (CHARLES E. DAY ET AL), 25 April 1989 (25.04.89), the whole document --	1-10
A	US 5244887 A (CARL D. STRAUB), 14 Sept 1993 (14.09.93), the whole document --	1-10
A	US 5502045 A (TATU MIETTINEN ET AL), 26 March 1996 (26.03.96), the whole document --	1-10
A	Biochimica et Biophysica Acta, Volume 732, 1983, Ikuo ikeda et al, "Some aspects of mechanism of inhibition of cholesterol absorption by beta-sitosterol" page 651 - page 658 --	1-10

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" erlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
9 April 1998	15 -04- 1998
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Jack Hedlund Telephone No. +46 8 782 25 00

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

02/03/98

International application No.
PCT/FI 97/00797

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4824672 A	25/04/89	CA 1309352 A	27/10/92
		US 4883788 A	28/11/89
US 5244887 A	14/09/93	NONE	
US 5502045 A	26/03/96	AU 664827 B	07/12/95
		CA 2102112 A	04/11/92
		DE 69127207 D,T	22/01/98
		EP 0594612 A,B	04/05/94
		SE 0594612 T3	
		FI 98730 B,C	30/04/97
		FI 934869 D	00/00/00
		FI 964951 A	11/12/96
		JP 6506909 T	04/08/94
		NO 933966 A	02/11/93
		PL 166991 B	31/07/95
		WO 9219640 A	12/11/92